REMARKS

Minor additions have been made to the specification, and claims 1-5, 9, 14, 16-19 and 22 have been amended. Claims 1-22 remain in the application.

Claims 1-22 were rejected under 35 U.S.C. 112, second paragraphs, as being indefinite. Claims 1-5, 9, 14 and 16 have been amended to overcome these rejections. Regarding claim 9, the Examiner's interpretation appears to be in error. It has to be stated that partially broken down starch is defined as starting substance (page 3, second to last paragraph). It is well known to those skilled in the art that partially broken down starch is achieved as so called "thin boiling starch" from native starch. In the following paragraph it is stated that it is preferred to carry out modification prior to hydrolysis. On page 7, second to last paragraph, it is stated that in case that modified starch products are to be produced the starch is preferably modified prior to a hydrolysis according to the invention. In contrast to the partially broken down starch (thin boiling starch) that serves as starting material the starch achieved from the main hydrolysis is a starch "already broken down for the most part" (see page 5, last paragraph).

Claims 1-6 and 8-20 were rejected under 35 U.S.C. 112, first paragraph. The additions to the specification at page 3 are believed to overcome this rejection. No new matter has been added to the specification.

Claims 1 to 8 and 10 to 22 were rejected as being unpatentable over SOMMERMEYER et al (US 5,218,108) in combination with KOMAI et al (US 3,446,664). This rejection is respectfully traversed. Claim 1 is clearly related to starch solutions. In contrast SOMMERMEYER as well as KOMAI only disclose the hydrolysis of starch dispersions.

SOMMERMEYER discloses a process wherein a starch is pre-extracted with methanol, followed by a methanolic hydrolysis and an alkali wash for protein extractions (col. 4, lines 4-20).

This process leads to partially broken down starch (thin boiling starch), a purified and partially broken down product of the natural starch. This starch then is used as starting material for hydroxyethylation followed by batch hydrolysis (col. 4, lines 21-37). This means that after the extraction and purification steps of the starch only one batch hydrolysis step in solution is disclosed.

In contrast to this in the present invention, it is possible to adjust the molecular weight very precisely by applying a main hydrolysis followed by a fine hydrolysis.

Further the process disclosed by KOMAI does not give any hint about a molecular weight distribution. This can already be seen from the wording used. KOMAI discloses a sacchrification process which is by definition the hydrolysis of a polymer to monomers and oligomers (sugars) while in the above mentioned patent application is related to starches (see claim 1: "hydrolytically broken down starch derivatives"), which are polymers by definition. Therefore KOMAI does not give any suggestion about the behavior of polymers and their molecular weight distribution under these conditions.

A further difference of the present invention to KOMAI is the flow speed in the tube reactors. While KOMAI discloses that the flow at the wall is slower than in the center of the reactor (see column 4, lines 15-18) in the present invention, it is essential that one horizontal layer does not mix with the one above or below (page 8, second paragraph).

Claims 1, 2, 4-7, 9-15, 17, 19-22 were rejected as being unpatentable over SOMMERMEYER et al in combination with KOMAI et al in view of SMOLKA et al (US 4,562,086). SMOLKA also does not disclose a procedure of the etherification of starch in a continuous manner. SMOLKA only suggests that the batch process disclosed also can be conducted continuously but does not explain that continuous process. Further it is stated that a sealed tank is the best method for carrying out the invention (col. 4, lines 48-50).

Therefore, neither a combination of SOMMERMEYER and KOMAI nor a combination of SOMMERMEYER, KOMAI and SMOLKA leads to a method and a device as claimed herein.

No additional claim fee is required by the Amendment.

In view of the above, it is believed that all remaining claims are now in condition for allowance and a notice to that effect is earnestly solicited.

Respectfully submitted,

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This object is solved by a method according to claim 1. Further advantageous embodiments of the method according to the invention are described in claims 2 to 9.

A further object of the invention is the use of the products produced according to a method as per claims 1 to 9 as a plasma diluent or to produce dialysis solutions. A further object of the invention is a device for carrying out a method for the continuous production of hydrolytically broken down starch derivatives according to claims 11 to 13.

To carry out the method according to the invention, all kind of ~~ordinary~~ starches or starch derivatives that are soluble in the aqueous hydrolysis solution can be used. ~~s~~Such ~~as,~~ starches can be derived for example~~,~~ from potato starch, wheat starch, cassava starch and the like~~.~~ while ~~T~~the starches rich in amylopectin are especially suitable, such as the wax-like milo (SORGHUM) starch, corn starch or rice starch. ~~The starches can be used modified or not modified;~~ ~~t~~The starch can also be used as an already partially broken down starch~~.~~ (a thin boiling starch). These starches have to be pre-treated or modified to be soluble in the aqueous hydrolysis solution. In particular, hydroxypropyl and preferably hydroxyethyl starches are used as modified starches.

In case the starch is already soluble in the aqueous hydrolysis solution ~~T~~the modification can be carried prior to hydrolysis, yet also after hydrolysis. Preferably, however, it is modified, ~~in particular~~ especially ethoxylated, prior to hydrolysis.

The modified or non-modified starch to be broken down is advantageously used as an aqueous solution or suspension, whereby suspension is understood to also mean grains

containing starch and found in water. The concentration of starch or modified starch in the solution or suspension can be adjusted within broad limits.

The concentration can already be set prior to hydrolysis with

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To carry out the method according to the invention, all kind of starches or starch derivatives that are soluble in the aqueous hydrolysis solution can be used. Such starches can be derived for example from potato starch, wheat starch, cassava starch and the like while the starches rich in amylopectin are especially suitable, such as the wax-like milo (SORGHUM) starch, corn starch or rice starch. The starch can also be used as an already partially broken down starch(a thin boiling starch). These starches have to be pre-treated or modified to be soluble in the aqueous hydrolysis solution. In particular, hydroxypropyl and preferably hydroxyethyl starches are used as modified starches.

In case the starch is already soluble in the aqueous hydrolysis solution the modification can be carried prior to hydrolysis, yet also after hydrolysis. Preferably, however, it is modified, especially ethoxylated, prior to hydrolysis.

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